Project Orion Overview

2nd Space Exploration Conference

Cleon Lacefield
Lockheed Martin
Project Orion Vice President and Program Manager

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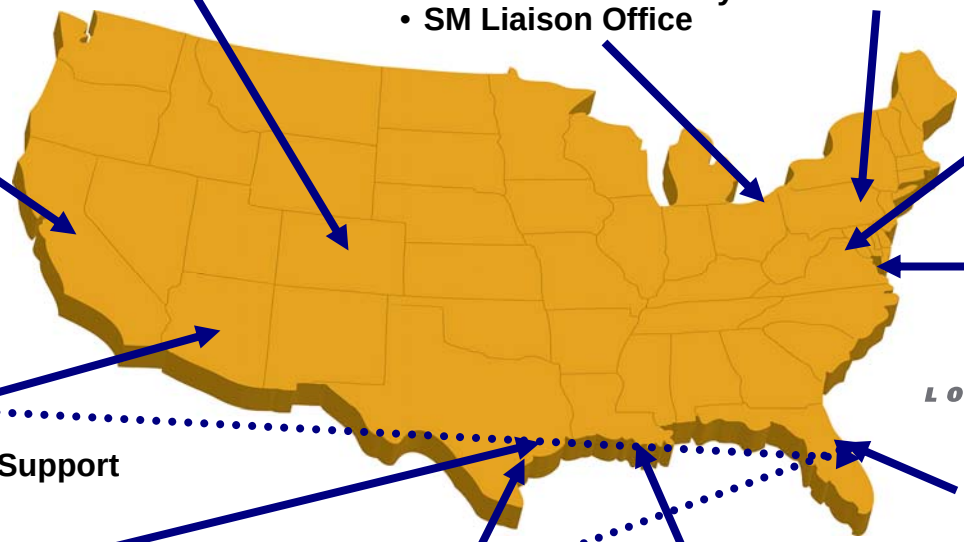
Orion - Crew Exploration Vehicle

- Orion is the next generation crew piloted spacecraft
  - Human access to Low Earth Orbit …
  - … and to the Moon and Mars
- Development will be managed by a diverse government - industry team
  - Project Manager located at Johnson
  - Project Management Office elements at Johnson, Langley and Glenn
  - Technical involvement by 9 NASA Centers
  - Lockheed Martin Team formally selected to be the industry partner

Targeting first mission to ISS no later than 2014h

Orion Lockheed Martin Industry Team



LOCKHEED MARTIN
- Systems & Design Engineering Support

Hamilton Sundstrand
A United Technologies Company
- Environmental Control & Life Support
- Active Thermal Control
- System Power Management

AEROJET
- Propulsion

LM GRC
- SM Liaison Office

Orbital
- Launch Abort System
- Safety & Mission Assurance

Honeywell
- Avionics
- Integrated System Health Management
- Crew Interface
- Mission Ground Ops Support

LM LaRC
- LAS Liaison Office

LOCKHEED MARTIN
KSC
- Final Assembly
- Checkout
- Acceptance Test
- Sustaining Engineering
- Spacecraft Refurbishment

LOCKHEED MARTIN
- Program Management
- Systems Integration
- Crew & Service Module Development
- Qualification Test
- Software Development

United Space Alliance
- Operator Interfaces
- Ground Processing
- Mission Flight Planning
- Software Development

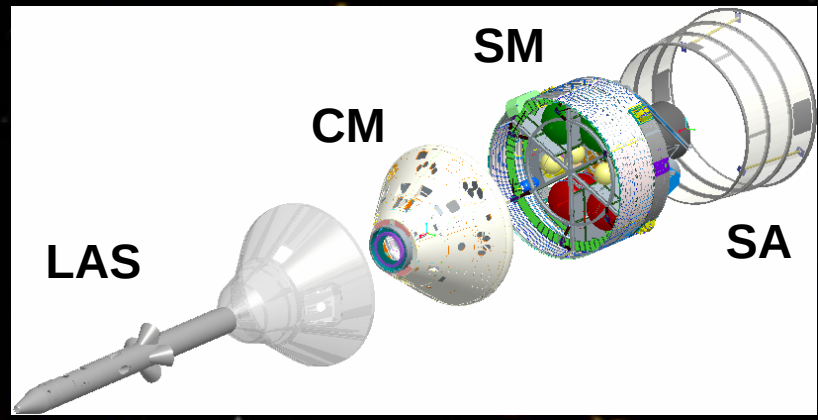
LOCKHEED MARTIN
Michoud
- CM and SM Structures

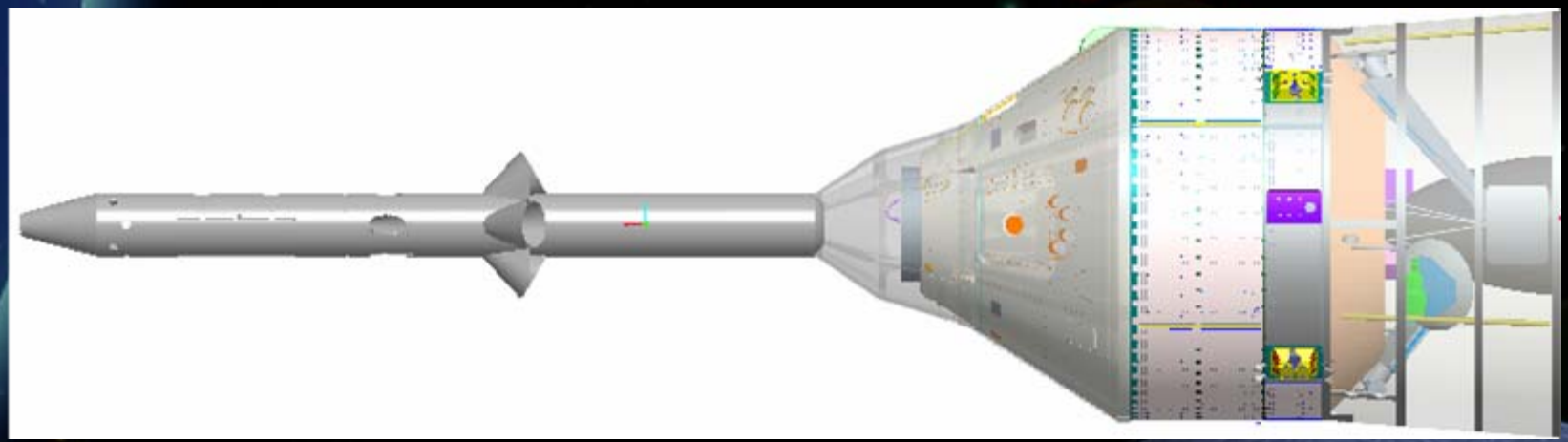
Orion Spacecraft General Arrangement

Mission Summary	
No. Crew	4 (lunar), 6 (ISS)
Crewed Mission Duration	18 days (lunar)
Quiescent Duration	210 days
Total ΔV	6250 ft/s

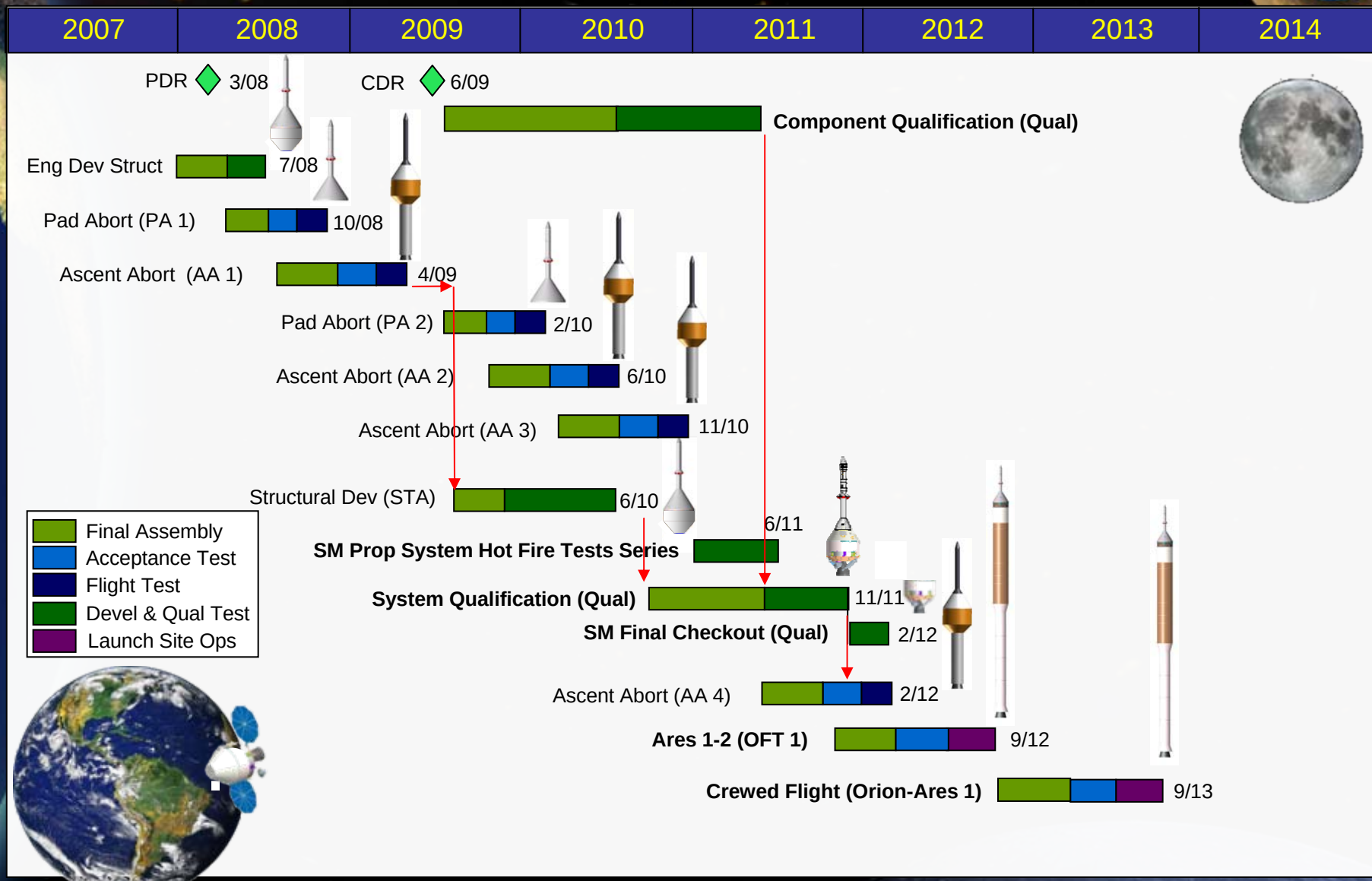
Configuration Summary	
Diameter (CM & SM)	16.5 ft
Pressurized Volume (Total)	691.8 ft^3
Habitable Volume (Net)	361 ft^3
SM Propellant	MMH/N_2O_4
CM Propellant	GO_2/GCH_4
Payload (Lunar Return)	220 lbs

Block 2 Mass Properties Summary	
GLOW	62031.5 lb
EMO (1/6 LAS Partial)	50684.6 lb

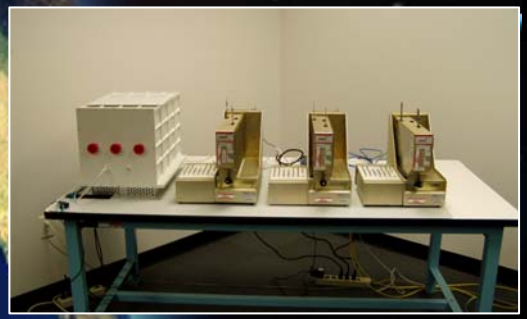




Flight Test Schedule – Latest Look



Exploration Development Lab in Houston Is Operational



787 Flight Computer Architecture

LM Command Select

Nozzle Actuators

RCS Simulator

Full-Scale CM Mockup
Integrated with Avionics Lab

Integrated Docking Simulator

Ergonomics

Focused Team Investment on Reducing Flight Software & Avionics Risk

Orion Advances the Human Exploration Vision

- Orion is our country's next generation crew piloted spacecraft and is critical to the future of human space exploration
  - Enables ISS research operations after Shuttle retirement
  - Provides core transportation for lunar and Mars human research and exploration missions

- We have assembled a diverse and talented workforce to build CEV which utilizes unique personnel and facility strengths from across NASA and industry
- We have built a management team experienced in meeting spacecraft development and operations challenges


Step into the future.